Docket No. DWHP200001

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re **PATENT** application of:

Applicant:	Donna Walker
Application No.:	10/632,231
For:	METHODS AND APPARATUS FOR STRESS RELIEF USING MULTIPLE ENERGY SOURCES
Filing Date:	July 31, 2003
Examiner:	Sikyin Ip
Art Unit:	1742

Mail Stop Amendment
Assistant Commissioner for Patents
Washington, D.C. 20231

DECLARATION UNDER 37 CFR § 1.132

Dear Sir:

Donna M. Walker declares as follows:

1. I am the inventor of the subject matter of the above-identified patent application.

2. I conducted comparative testing of two 4340 steel samples to verify the acceleration in stress relief of my invention. The samples were each standard ASTM E8 8" X 0.375" thick tensile flat tensile specimens made from 4340 steel as shown in the machining drawing attached hereto as EXHIBIT A, both tested samples were from the same lot, and had the same initial internal mechanical stresses prior to testing. The experimental procedure for testing the steel samples is as follows.

3. The first steel sample underwent separate thermal and vibration processes that did not overlap in time. In the thermal process, the first sample was heated to a temperature of approximately 500° F for 120 seconds. In the subsequent non-overlapping vibration process, the first sample was vibrated at a frequency of about 35 Hz and an amplitude of about 24 cm/kg (motor setting) for 120 seconds.

4. The second steel sample was tested according to my invention by concurrent application of thermal and vibration processes in excess of the activation energy for 4340 steel for 30 seconds, with the temperature at approximately 500° F and the vibration provided at a frequency of about 35 Hz and an amplitude of about 24 cm/kg (motor setting).

5. I measured the stress of the first and second samples both before and after testing using the following measurement technique. Hole drilling residual stress analysis was performed using an RS200 Micromeasurements Milling Machine especially designed for these measurements. Data analysis was performed using HDRILL, an analysis program per ASTM E837 Standard Test Method for Hole-Drilling Residual Stress Measurements.

6. The test results for the first and second samples are shown in the attached EXHIBIT B. As shown in the results of EXHIBIT B, the amount of stress removed by the concurrent application of the thermal and vibratory energy types to the second sample is greater than that removed from the first sample by the separate thermal and vibration processes.

7. The acceleration in stress change achieved by concurrent processing using multiple energy types as exemplified in the results of EXHIBIT B is independent of the type of material used, and may be verified using any measurement techniques.

8. This declaration is submitted prior to final rejection.

DECLARATION

9. As a person signing below, I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

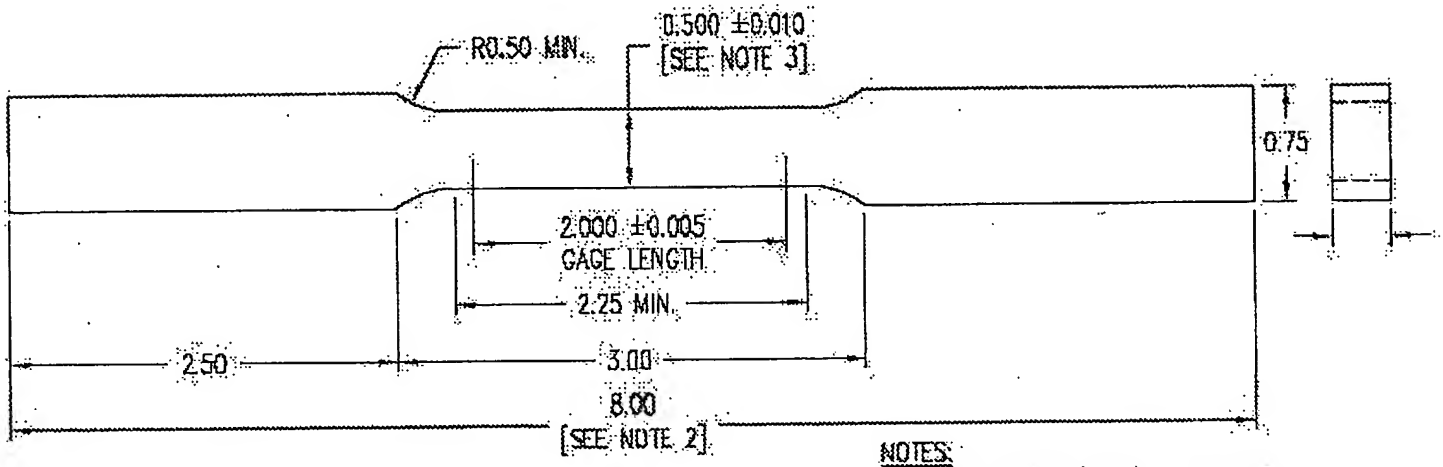
SIGNATURE

10. INVENTOR:

Full name of inventor:	Donna M. Walker
Inventor's Signature:	Donna M. Walker
Date:	November 15, 2005
Country of Citizenship:	U.S.
Residence:	40388 Ladene Lane Novi, Michigan 48375

EXHIBIT A

0.5 x 2.0 STANDARD FLAT TENSILE SPECIMEN



NOTES:
1. ASTM E8, B557, A370, E646, E517
2. THE OVERALL LENGTH CAN BE REDUCED TO 5.91", EXCEPT FOR K–, n–, AND r–VALUE TESTING (E646
3. WIDTH OF REDUCED SECTION CAN BE TAPERED 0.004" SMALLER AT THE CENTER. (TAPER ALLOWED FOR ALL SPECIMENS; SUGGESTED FOR CASTINGS / LOW DUCTILITY METALS.

LENGTH	BLANK SIZE (±0.03)
STANDARD	1 x 8 x THICKNESS
MINIMUM	1 x 4.625 x THICKNESS

EXHIBIT B

H-DRILL RESIDUAL STRESS CALCULATION

A1023 Patent Bkup 4340 Fe #20 as rld + Heat + Vib

mean diameter = 0.202 in
Hole diameter = 0.065 in
depth limit = 0.04 in

Sequential application of vibration (120 sec) and heat (500 F for 120 sec)

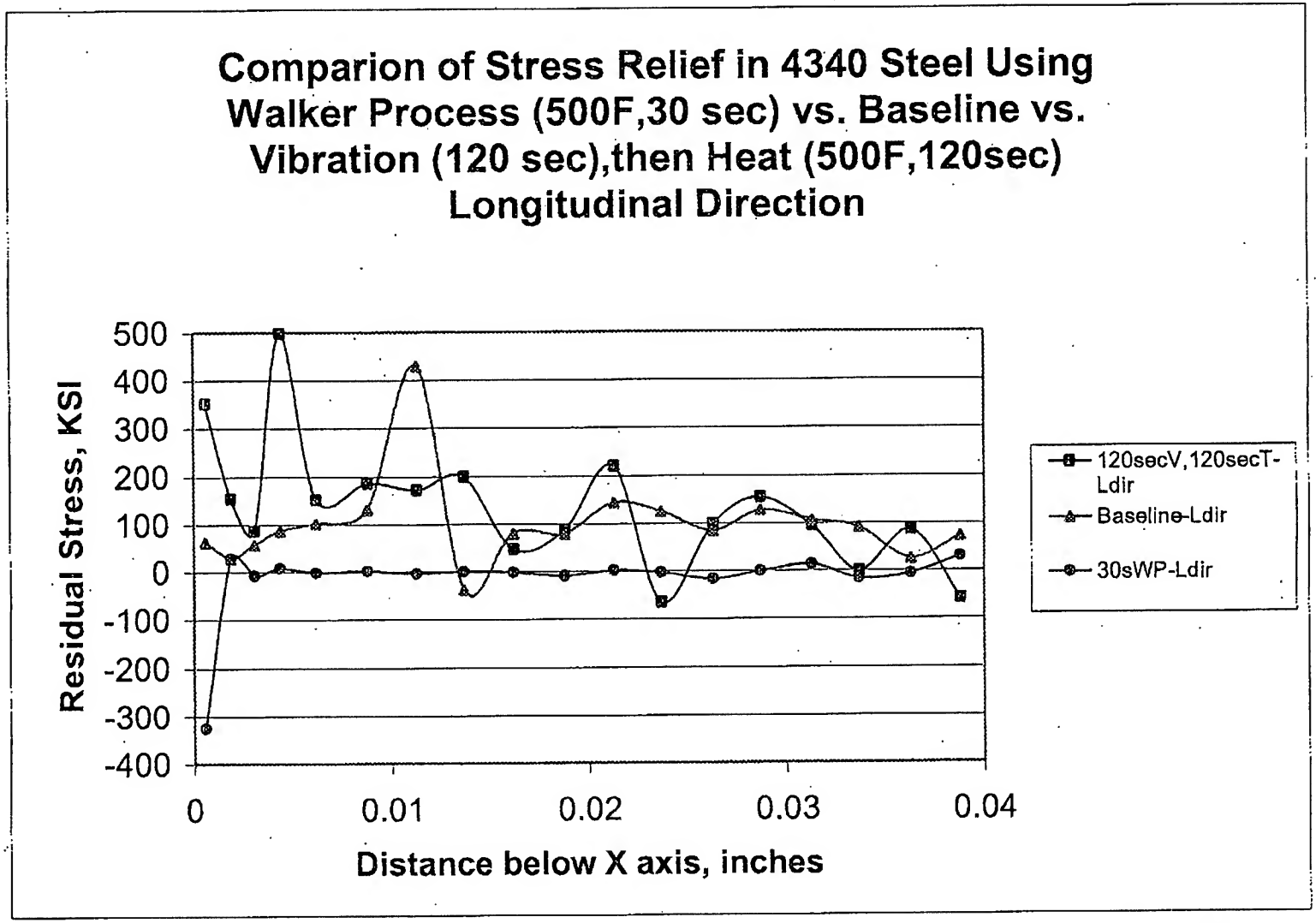
---	Stresses		
Depth in	Sx ksi	Sy ksi	Txy ksi
0.0006	351.7	84.9	-48.5
0.0019	155	32	22.2
0.0031	87.3	23.7	7.8
0.0044	497.5	129.5	-62.8
0.0062	152.3	34	7.5
0.0088	186	43.6	-5.6
0.0113	171.3	46.5	-9.1
0.0137	198.9	55.4	-74.1
0.0162	46.7	7	-8.9
0.0188	86.7	23.5	-39.7
0.0213	220.5	70.1	-82.7
0.0237	-65.1	-33.6	-23.7
0.0263	99.3	30.2	-8.2
0.0287	156	57	-13.1
0.0313	94.5	26.1	-6
0.0337	-1.3	-12	-41.3
0.0363	85.5	22.6	-13.5
0.0388	-58.1	-47.4	-3.1

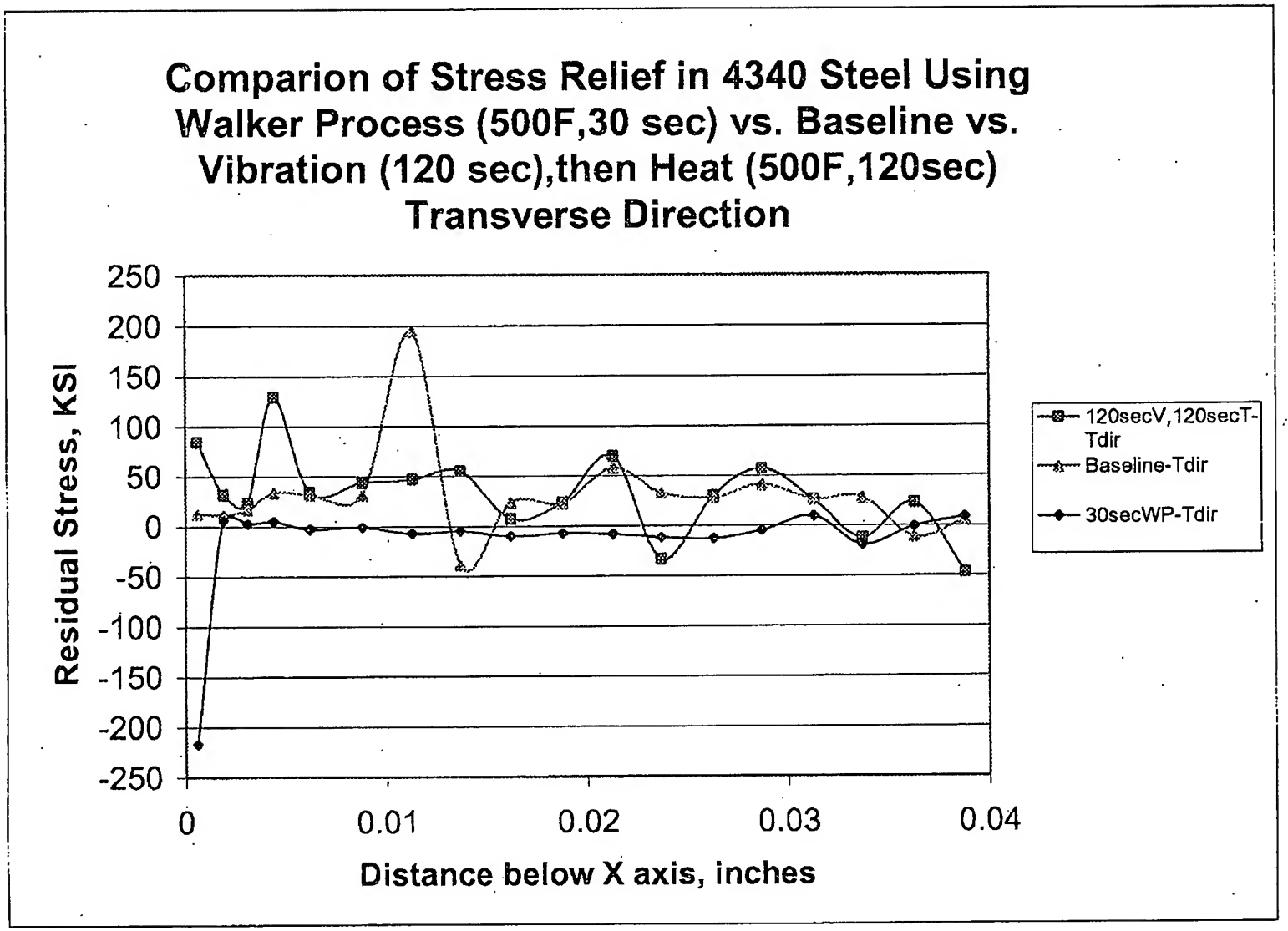
#1 Rolled - Baseline

Depth in	Sx ksi	Sy ksi	Txy ksi
0.0006	63.4	12.7	0
0.0019	29	11.7	27.7
0.0031	57.1	17.1	3
0.0044	86.9	34.4	28
0.0062	101.9	32.3	16.3
0.0088	131.9	31.7	22.6
0.0113	429.3	194.8	103
0.0137	-36.9	-38.5	-20.4
0.0162	80.6	23.7	0.7
0.0188	79.6	23.4	3.5
0.0213	145.3	58.4	7.6
0.0237	125.5	33.1	16.1
0.0263	84.9	28.2	-6.8
0.0287	127.9	41	2.4
0.0313	107.9	26.5	0.8
0.0337	90.8	28.4	4
0.0363	24.9	-11.1	-10.5
0.0388	73.4	5.6	-10.4

#10N - Walker Process - 500 F, 30 sec.

Depth in	Sx ksi	Sy ksi	Txy ksi
0.0006	-325	-217.2	-155.3
0.0019	27.9	6.4	-18.2
0.0031	-7.3	2.8	-4.9
0.0044	7.4	5.2	-3.7
0.0062	-1.7	-2.7	-7.6
0.0088	1.6	-0.8	-2.1
0.0113	-3.7	-7.2	2.3
0.0137	-0.1	-4.8	-1.3
0.0162	-2.2	-10.2	-3.6
0.0188	-9.4	-7.4	3.6
0.0213	1.2	-8.3	-0.9
0.0237	-3	-11.5	-8.2
0.0263	-16.9	-12.9	37.9
0.0287	-1.4	-4.7	-32.7
0.0313	13	9.7	7.5
0.0337	-15.8	-19.1	-10.8
0.0363	-6.4	-0.6	-1.1
0.0388	28.6	8.9	-6.4


Comparion of Stress Relief in 4340 Steel Using Walker Process (500F,30 sec) vs. Baseline vs. Vibration (120 sec),then Heat (500F,120sec) Longitudinal Direction
Residual Stress, KSI
500
400
300
200
100
0
-100
-200
-300
-400
0
0.01
0.02
0.03
0.04
Distance below X axis, inches
120secV,120secT-Ldir
Baseline-Ldir
30sWP-Ldir


Comparion of Stress Relief in 4340 Steel Using Walker Process (500F,30 sec) vs. Baseline vs. Vibration (120 sec),then Heat (500F,120sec) Transverse Direction
Residual Stress, KSI
250
200
150
100
50
0
-50
-100
-150
-200
-250
0
0.01
0.02
0.03
0.04
Distance below X axis, inches
120secV,120secT-Tdir
Baseline-Tdir
30secWP-Tdir